

COVID-19 Hospital Based Sentinel Surveillance Report

Data status: January 23, 2023

1. Introductory Summary

The COVID-19 Hospital Based Surveillance system (CH-SUR) was established in 2018 to capture influenza-related hospitalizations. By March 1, 2020, four days after the first confirmed COVID-19 case was reported in Switzerland, the adapted program was ready to also register hospitalizations related to laboratory-confirmed SARS-CoV-2 infections.

Currently, 19 hospitals are actively participating (18 for influenza), including most cantonal and university hospitals, which cover a large proportion of pediatric and adult hospitalized patients throughout Switzerland. The CH-SUR statistics register, among other, the number and duration of hospitalizations, intensive care unit (ICU) stays and whether the patient died during hospitalization of or with COVID-19 or influenza. For further definitions and details on the data, please check the [glossary and supplemental information](#) at the end of this report.

The current report covers the period from January 01, 2022, when the Omicron variant had become dominant, until January 23, 2023. During this period, data were collected from 18,986 episodes of hospitalization for COVID-19 and 2,578 for influenza. During the same time, 23,502 hospitalization episodes with laboratory-confirmed SARS-CoV-2 infection were reported to the FOPH under the mandatory reporting system for all of Switzerland. The CH-SUR system thus covered approximately 80.8% of all hospitalizations related to SARS-CoV-2 reported in Switzerland. An overview of the data recorded in the most recent two months for which enough data is available, is displayed in Figure 1 and 2.

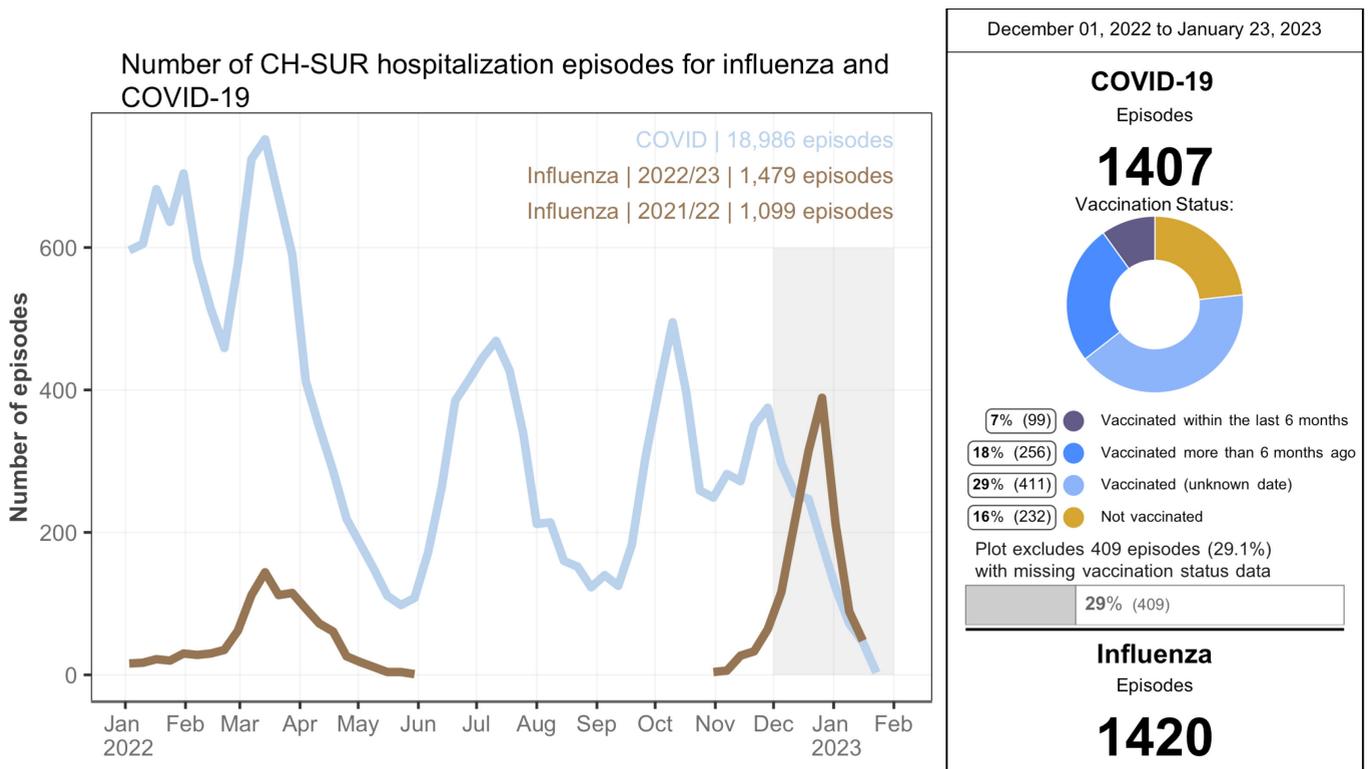


Figure 1: Overview information of the most recent data on episodes of hospitalization by week. Data from the last two months, marked in gray, are considered provisional due to data entry delays. For the 2021/22 influenza season: only episodes starting past January 2022 are included. Number of participating hospitals for influenza: 19 for season 2021/22, 18 for season 2022/23.

Overview of CH-SUR Episodes, ICU admissions and Deaths from December 01, 2022 to January 23, 2023

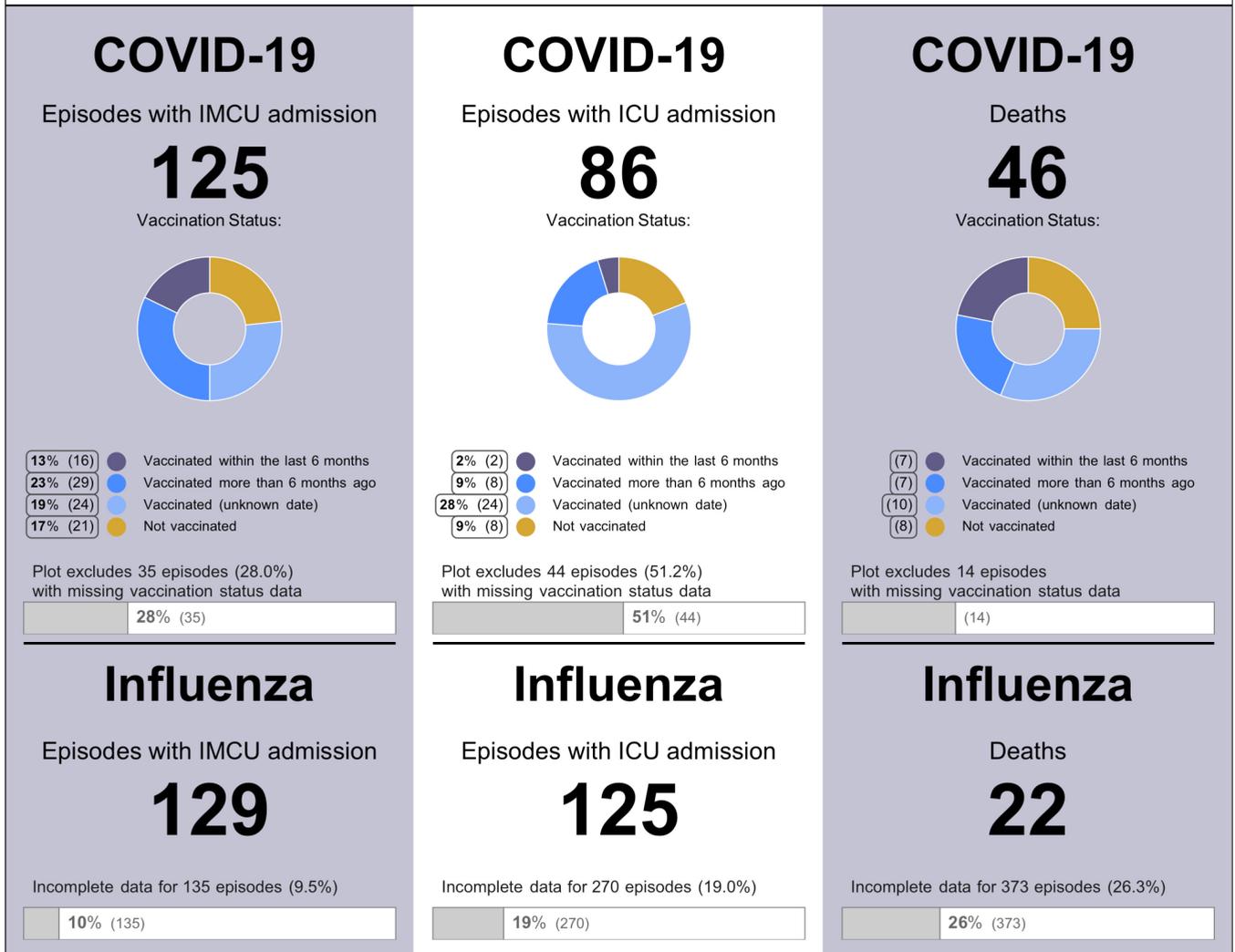


Figure 2: Overview information of the most recent data on episodes of hospitalization.

2. Hospitalizations and patient characteristics

Between January 01, 2022 and January 23, 2023 and among the 19 hospitals actively participating in CH-SUR, 18,986 **episodes** were registered, accounting for a total of 19,486 hospitalizations. There were more hospitalizations than **episodes** because some episodes include multiple **hospitalizations** (for more details see section **glossary and supplemental information**).

Most patients (97.6% [18,523 of 18,986]) were hospitalized only once during an episode, while 2% of the registered episodes (463 of 18,986) included two to four hospitalizations. Only one episode included five hospitalizations.

Among all episodes, the majority (52% [9,880 of 18,986]) of the episodes concerned male patients compared to female patients (47.9% [9,092 of 18,986]), and the age distribution was skewed towards older persons (Figure 3a and b). The largest age category corresponded to patients aged 80 and above (45.0% [627]).

Figures 3c and 3d show the sex and age distribution ratio over time. During most months, more men than women were admitted. During the period of observation, the proportion of episodes concerning patients aged 50 years old and above was the lowest in February 2022 with 67.9% (1,512 of 2,226). In October 2022, 89.3% (1,509 of 1,689) of episodes concerned patients 50 years old and above (Figure 3d).

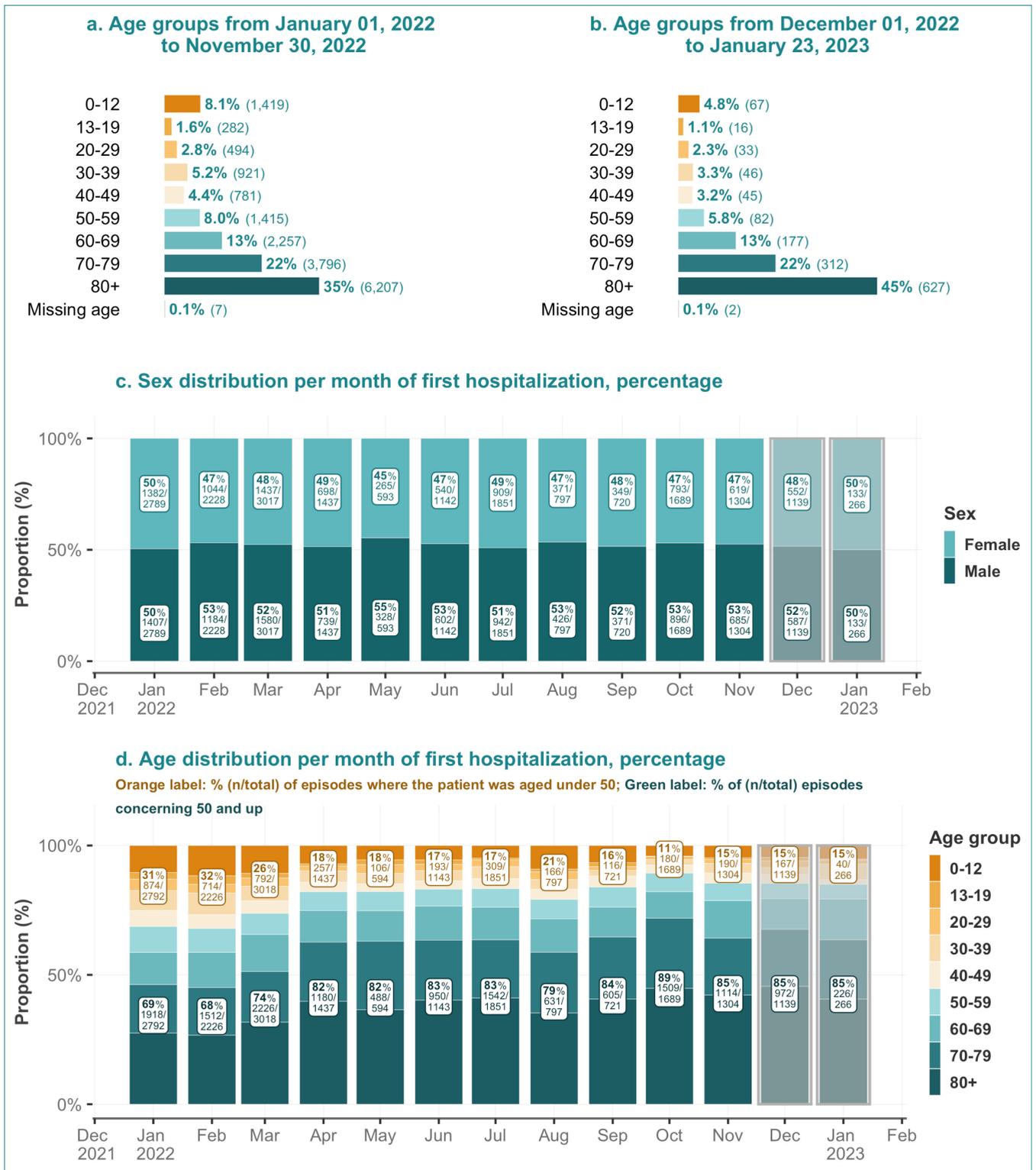


Figure 3: Demographic characteristics: sex and age distribution of admitted hospitalized patients, overall and per month. For episodes with multiple hospitalizations, the admission date of the first hospitalization was used. Data from the last two months (highlighted gray) is considered provisional due to entry delays. The 'other' sex category was removed from panel c, and the missing age group was removed from panel d.

2.1. Origin of infection

From January 01, 2022 to January 23, 2023, the overall percentage of nosocomial infections among all documented episodes was 21.6% (4,083 of 18,986) while episodes linked to community acquired infections accounted for 76.4% (14,497 of 18,986) (Figure 4). 2.1% of the episodes could not be classified either as nosocomial or community acquired.

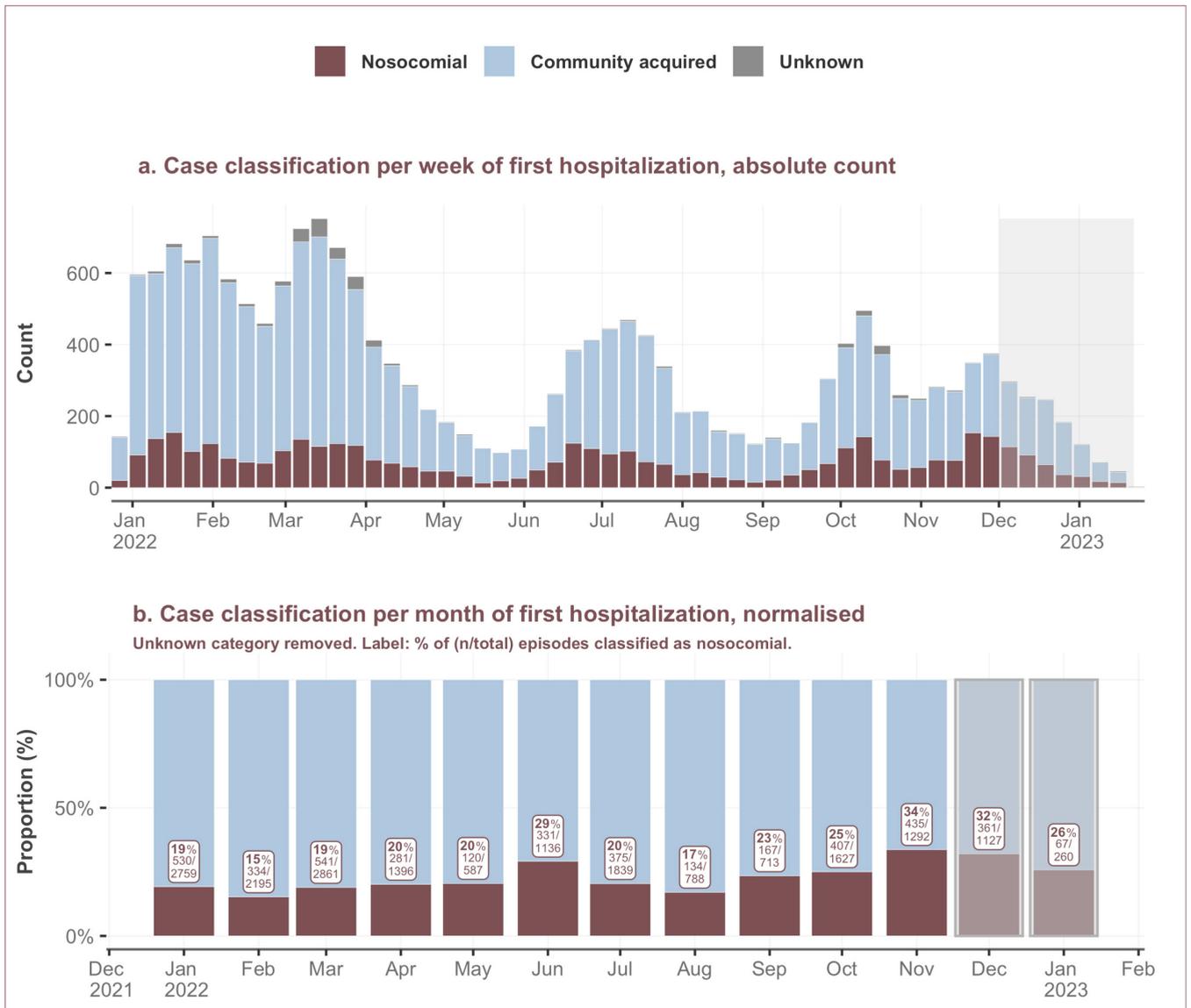


Figure 4: Case classification (infection source) of the episodes. The absolute count of episodes over time (panel a) and the proportion (normalized in %) of episodes by infection source (panel b). For episodes with multiple hospitalizations, the case classification of the first hospitalization was considered. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.

Compared to the other age groups, the nosocomial infections affected the patients aged 80 years and above the most, accounting for 1,646 (45%) of the nosocomial episodes. In comparison, 4,481 (33%) of episodes in the period from January 01, 2022 to November 30, 2022 with community-acquired infections corresponded to patients aged 80 years and above (Figure 5a).

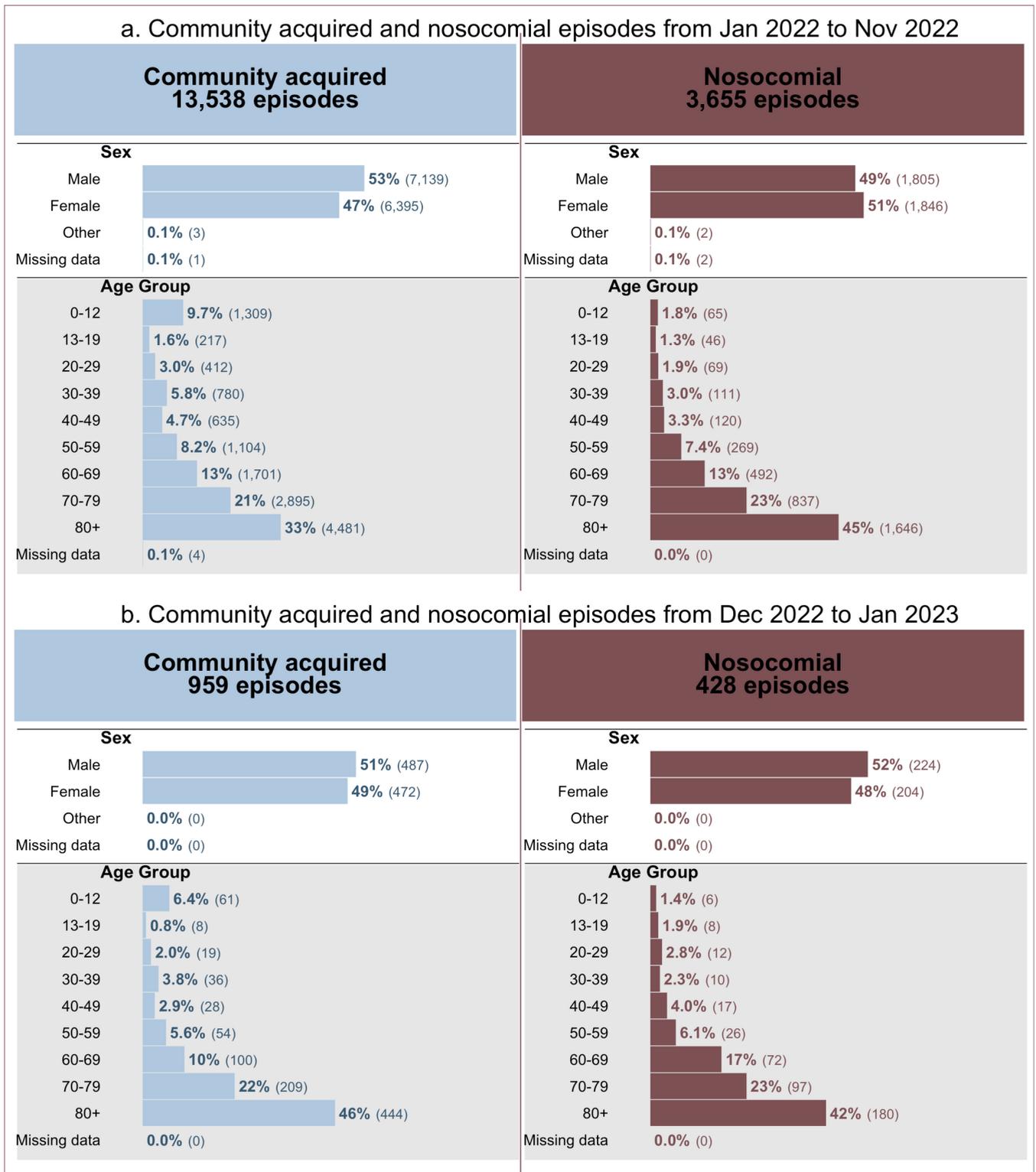


Figure 5: Comparison of community acquired and nosocomial cases by demographic characteristics.

2.2. Vaccination status at admission over time

For these analyses, the **vaccination status** of a patient considers the vaccine doses received up to the time of a positive COVID-19 test, specifically up to the time when the sample for the test was collected.

As of January 23, 2023, 69.7% of the Swiss population was vaccinated with at least one dose and 10.7% were vaccinated within the last 6 months. It is important to note that we can know the percentage of the population which is vaccinated (through administrative records), but only approximate the proportion of the population which is immunized. Recent studies from **Corona Immunitas** are indicating that **the population immunization (by vaccination and/or previous infection) is nearing 100%**.

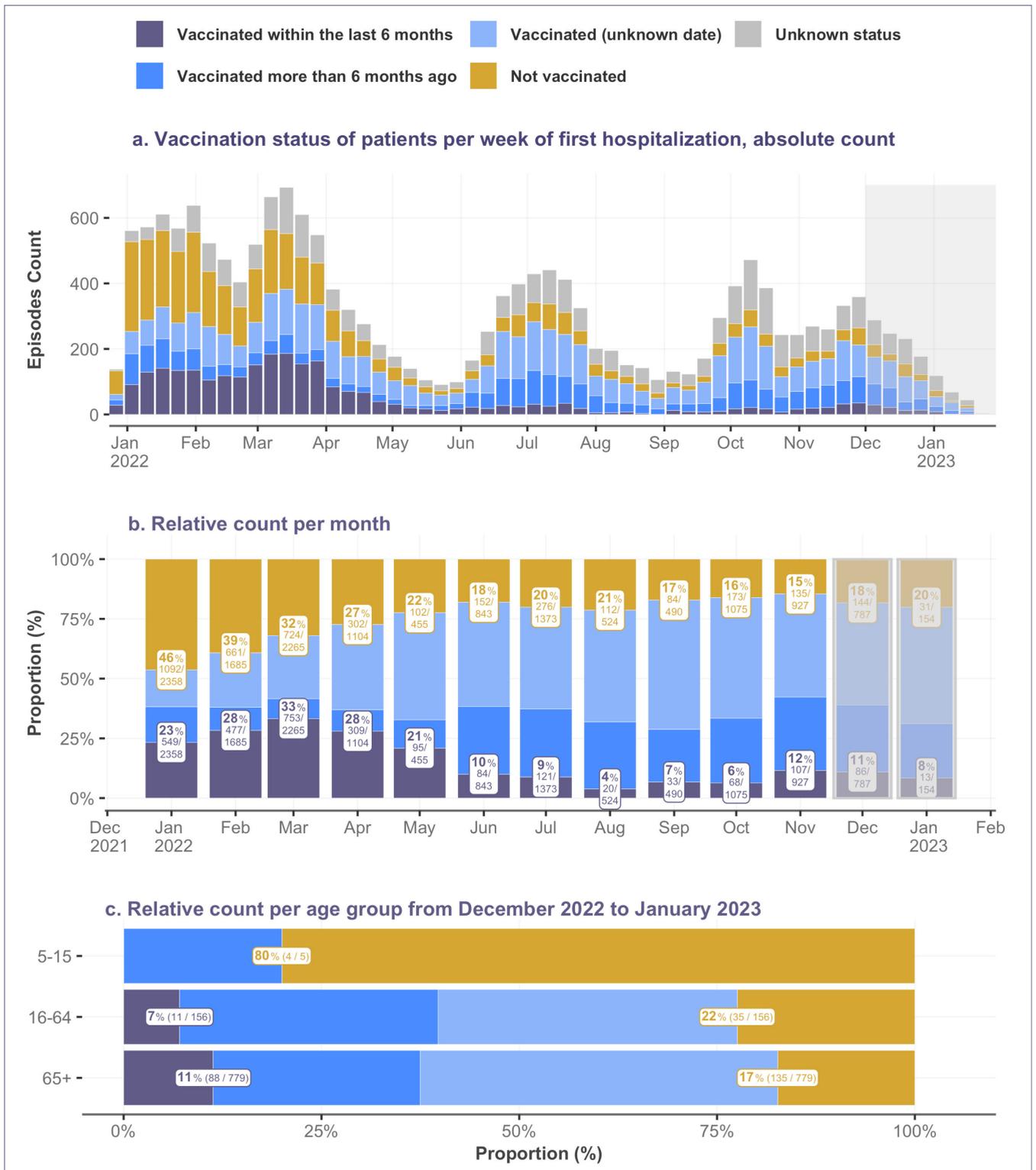


Figure 6: Episodes by vaccination status over time and by age group. For episodes with multiple hospitalizations, the vaccination status for the first hospitalization was considered. Episodes with first admission date after November 30, 2022 were excluded due to data completeness considerations. For Figure 5c only: Episodes with missing ages and children between 0 to 4 years old (following vaccination recommendations) were excluded from the analysis.

3. Outcomes

3.1. Outcomes over time

Figure 7 shows the final outcomes of episodes over time (Figure 7a & 7b). Episodes resulting in death, for which COVID-19 was the cause of death (died of COVID-19) are shown separately from those with an alternative cause of death (died with COVID-19, but not of COVID-19). A medical doctor at the hospital for each CH-SUR participating center determined whether a patient died of COVID-19 or another cause. Episodes where the cause of death was not certain, but there was a COVID-19 diagnosis (in conformity with inclusion criteria for CH-SUR) were counted as died of COVID-19 or suspected death of COVID-19. The outcome “discharged” includes patients who were transferred out of the CH-SUR system. Episodes with “pending or missing outcomes” correspond to either patients who were still hospitalized or whose outcomes were not yet recorded in the database at the date of data extraction. Because of the higher proportion of incomplete data during the most recent months, case fatality rates from these months should be interpreted with caution.

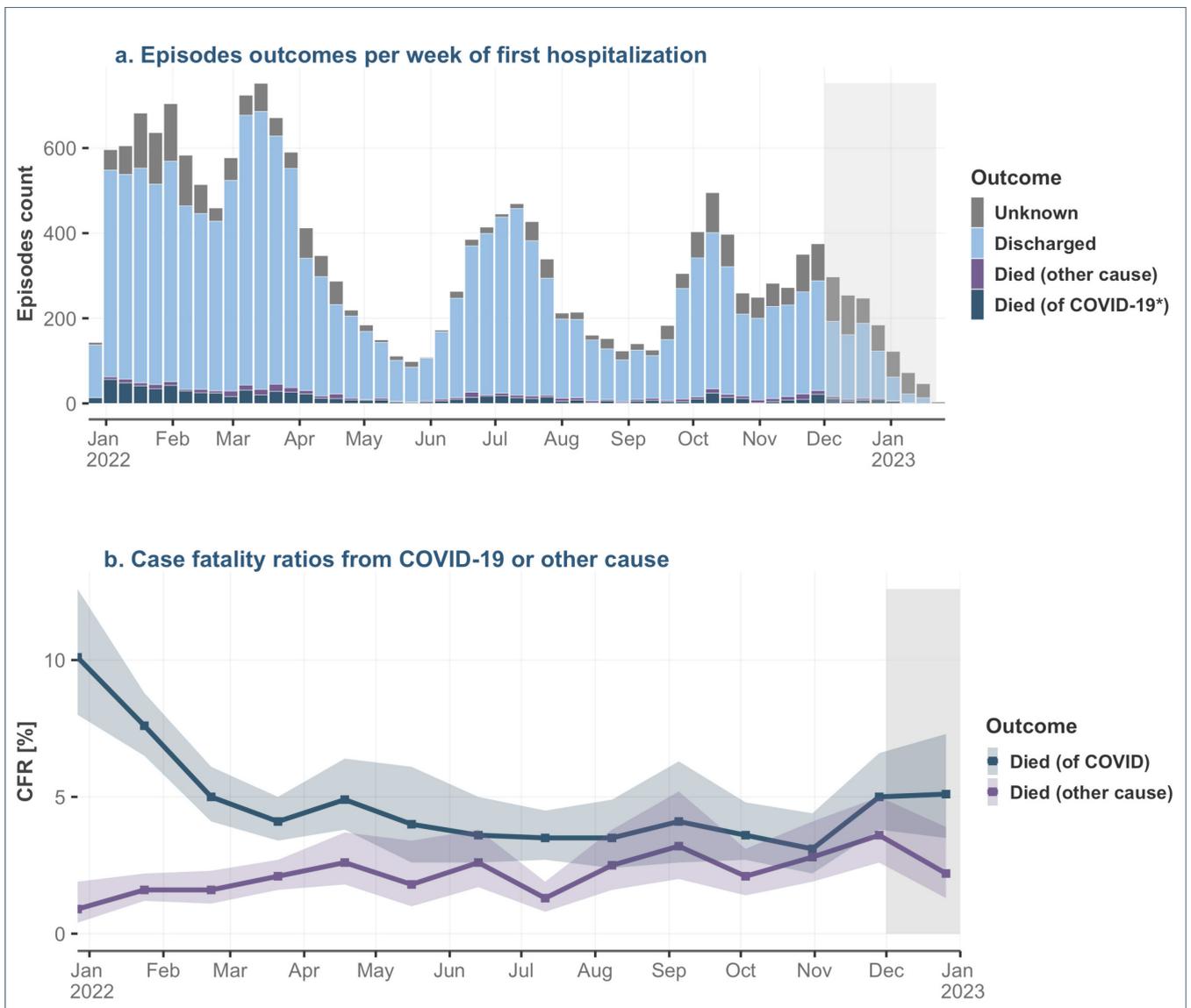


Figure 7: Outcomes for COVID-19 related episodes over time. Includes records up to January 23, 2023. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. Episodes where the cause of death was not certain, but there was a COVID-19 diagnosis (in conformity with inclusion criteria for CH SUR) were counted as Died of COVID-19 or suspected death of COVID. (* Died of COVID-19 as a confirmed or suspected cause of death). The coloured bands on this plot indicate the 95% confidence interval around the estimated CFR.

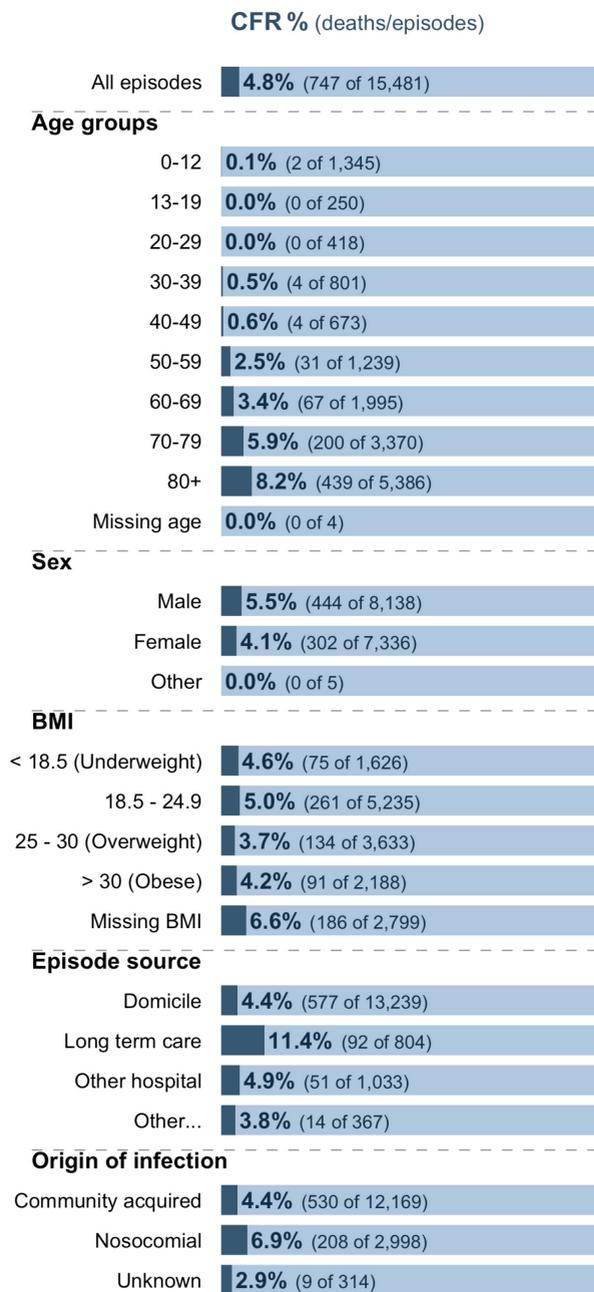
3.2. Case fatality rate (CFR) across demographic and risk groups

Since January 2022 and until November 2022, the case fatality rate (CFR) increased with increasing age, from 2.5% (31 of 1,239) in episodes of patients aged 50-59, and to 8.2% (439 of 5,386) in episodes of patients aged 80+. CFR% was greater in men than in women: 5.5% (444 of 8,138) vs 4.1% (302 of 7,336) respectively. (Figure 8a)

The overall CFR% of the most recent period for which enough data is available (months December 2022 and January 2023, Figure 8b) was higher than the CFR% from January 2022 until November 2022 (5.1% vs. 4.8%).

Of note, there was no clear mortality difference across different BMI groups. Data regarding CFR% and vaccination status can be found in section 3.3.

a. CFR % : 15,481 episodes with first hospitalization between January 2022 and November 2022



b. CFR % : 896 episodes with first hospitalization between December 2022 and January 2023

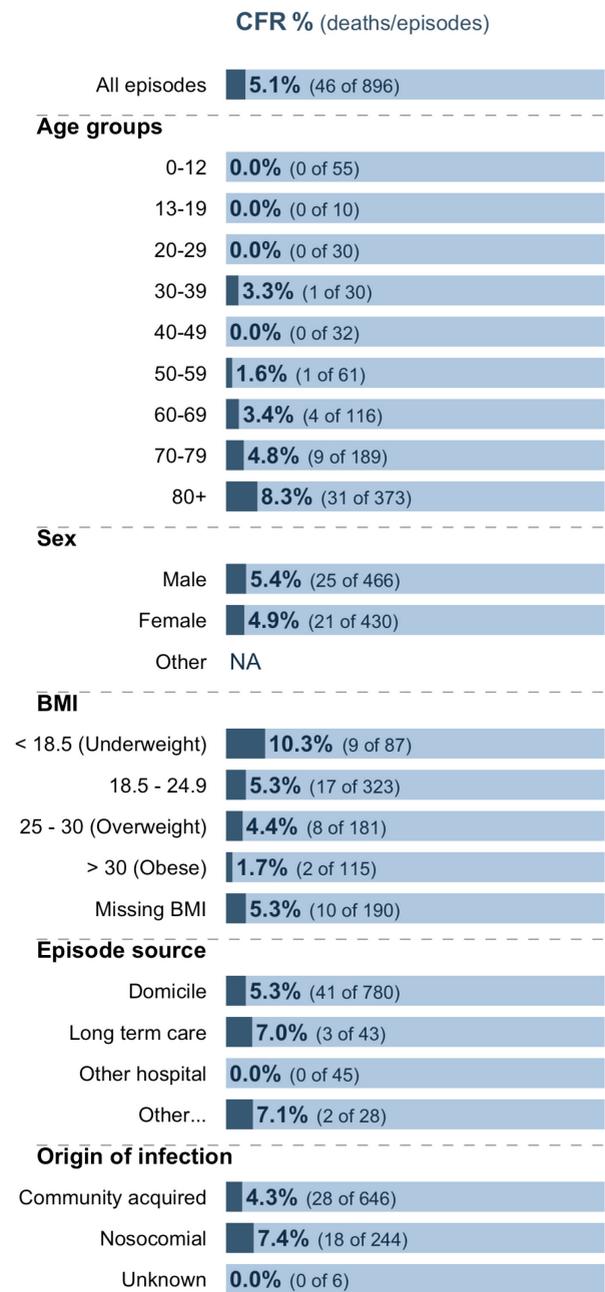


Figure 8: Case fatality rate (CFR) % among demographic and risk groups: percentage of hospitalization episodes, which ended in the death of the patient of COVID-19 in hospital. Records with incomplete data (ongoing hospitalization episodes or with a pending outcome in the database) were not included.

3.3. CFR by age group and vaccination status

For the most recent time period for which reliable data is available, the case fatality rate is displayed by age group and vaccination status (Figure 9).

The data should be interpreted with caution, as local peaks most often result from a small number of cases (for example, the peak in CFR% concerning patients vaccinated within the last 6 months in the age group of 80 and above patients in August 2022 is due to 1 death out of 6 episodes).

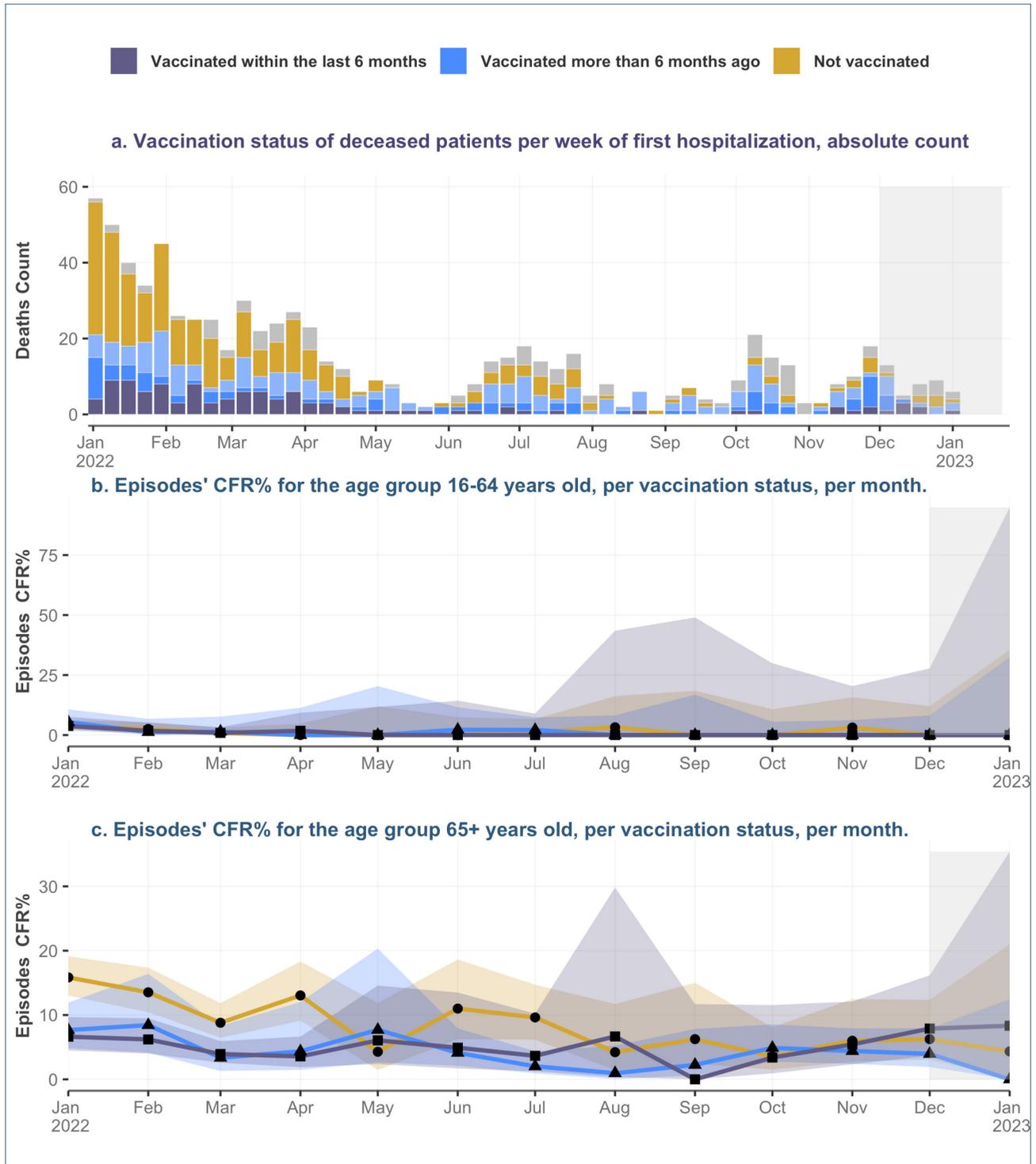


Figure 9: Case fatality rate (CFR%) by age and by vaccination status over time: percentage of episodes, which ended in the death of the patient of COVID-19 in hospital. Records with incomplete data were not included. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. The coloured bands on this plot indicate the 95% confidence interval around the estimated CFR.

4. Intensive care unit (ICU) admission

4.1. ICU, IMCU admission and ventilation administration over time

Figure **10** shows the distribution over time of episodes requiring ICU, IMCU admissions or both, as well as the ventilation type used. Figure **10b** only includes episodes with known information on ICU and IMCU stay. Figure **10b** shows that the proportion (in %) of **ICU** admission has remained relatively stable over time since January 2022.

ICU and IMCU admissions include both patients that were hospitalized *because* of COVID-19 and *with* COVID-19 (admitted with COVID-19, but not because of COVID-19).

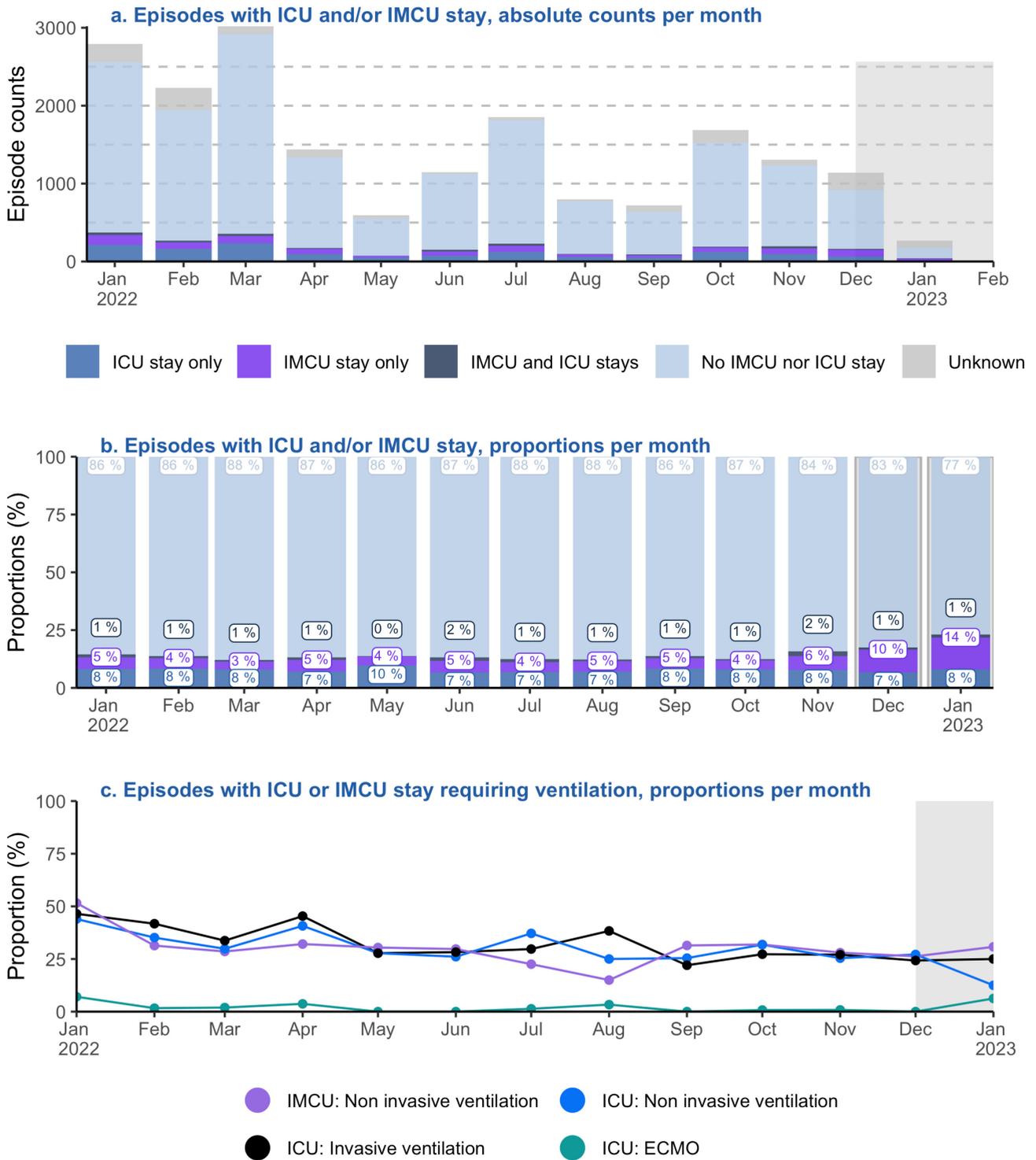


Figure 10: Counts and proportion of episodes with at least one ICU or IMCU admission over time.

4.2. ICU admission across demographic and risk groups

From January 2022 to November 2022, **ICU** admission probability across ages was roughly bimodal with a peak for the 10-19-year age group and for the 60-69 age group. The 60-69 age group had the highest probability of admission to the ICU, with 14.2% (321 of 2,257) of episodes including at least one ICU admission. During the same period, individuals aged 80 and above were least likely to be admitted to the ICU, with 4.3% (269 of 6,207) of the episodes including at least one ICU admission. Males were more likely to be admitted to the ICU than females. Overall, admissions to the ICU were registered for 9.9% of the episodes concerning males, compared to 6.5% of the episodes concerning females. Episodes of patients transferred from other hospitals had a high probability of ICU admission: 23% of such episodes (263 of 1,141) required at least one ICU admission, compared to an overall admission rate of 8.3% (Figure 11a).

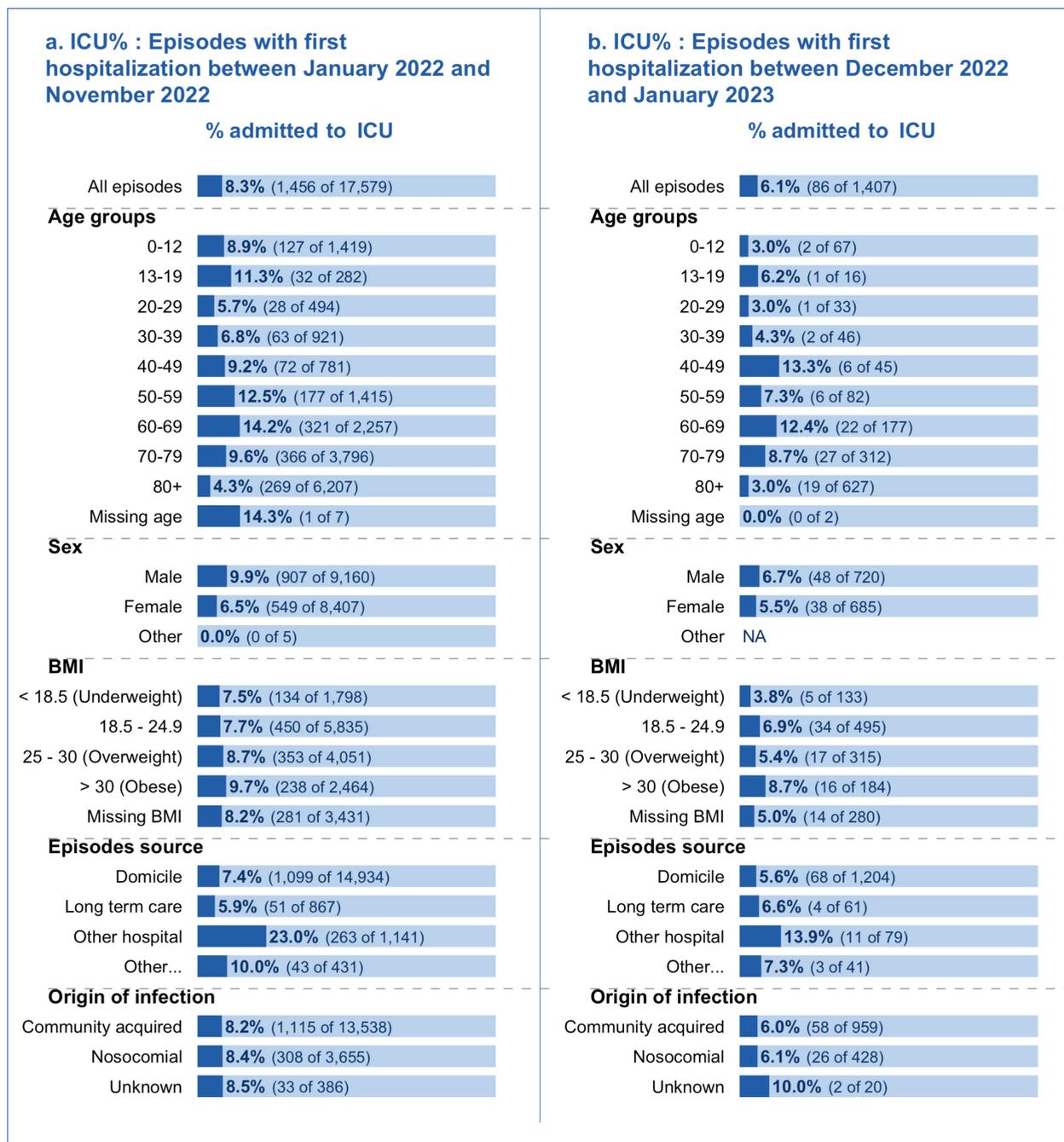


Figure 11: Percentage of hospitalization episodes with at least one ICU admission, grouped by demographic and risk factors, over two time intervals. For episodes with multiple hospitalizations, we considered whether they were admitted to the ICU during any of their hospitalizations. Records with incomplete data were not included.

4.3. ICU admission rate by vaccination status

Figure 12 shows the ICU admission rate, which is the number of episodes requiring an admission to the ICU over all episodes registered, stratified by vaccination status.

The percentage of not vaccinated patients among episodes with ICU stay decreased sharply from January to April from 62% to 27% and has fluctuated since then. (Figure 12b)

The relative counts for the age groups of 5-15 have to be interpreted with caution due to low numbers. (Figure 12c)

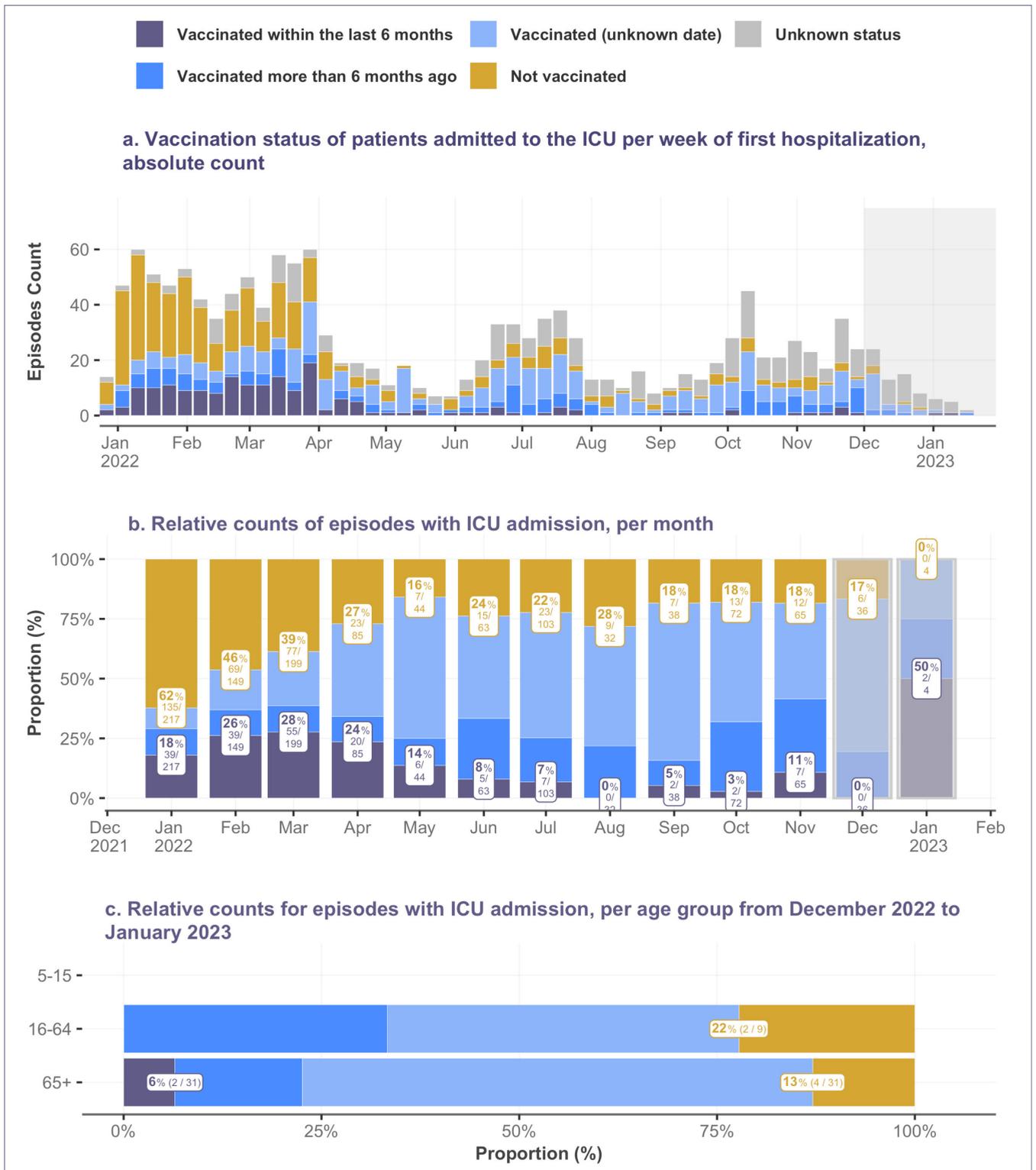


Figure 12: Demographic characteristics of hospitalized patients by immune status and immune status of patients over time. For episodes with multiple hospitalizations, the immune status for the first hospitalization was considered. For Figure 5c only: Episodes with missing ages and children between 0 to 4 years old (following vaccination recommendations) were excluded from the analysis.

4.4. ICU admission rate by age group and vaccination status

Figure 13 shows the ICU admission rate by age group and by vaccination status. Plots for the age groups 5-15 should be interpreted with caution, as the ICU% is calculated on a small number of episodes. The same caution applies in recent months, where peaks may be due to low number of episodes.

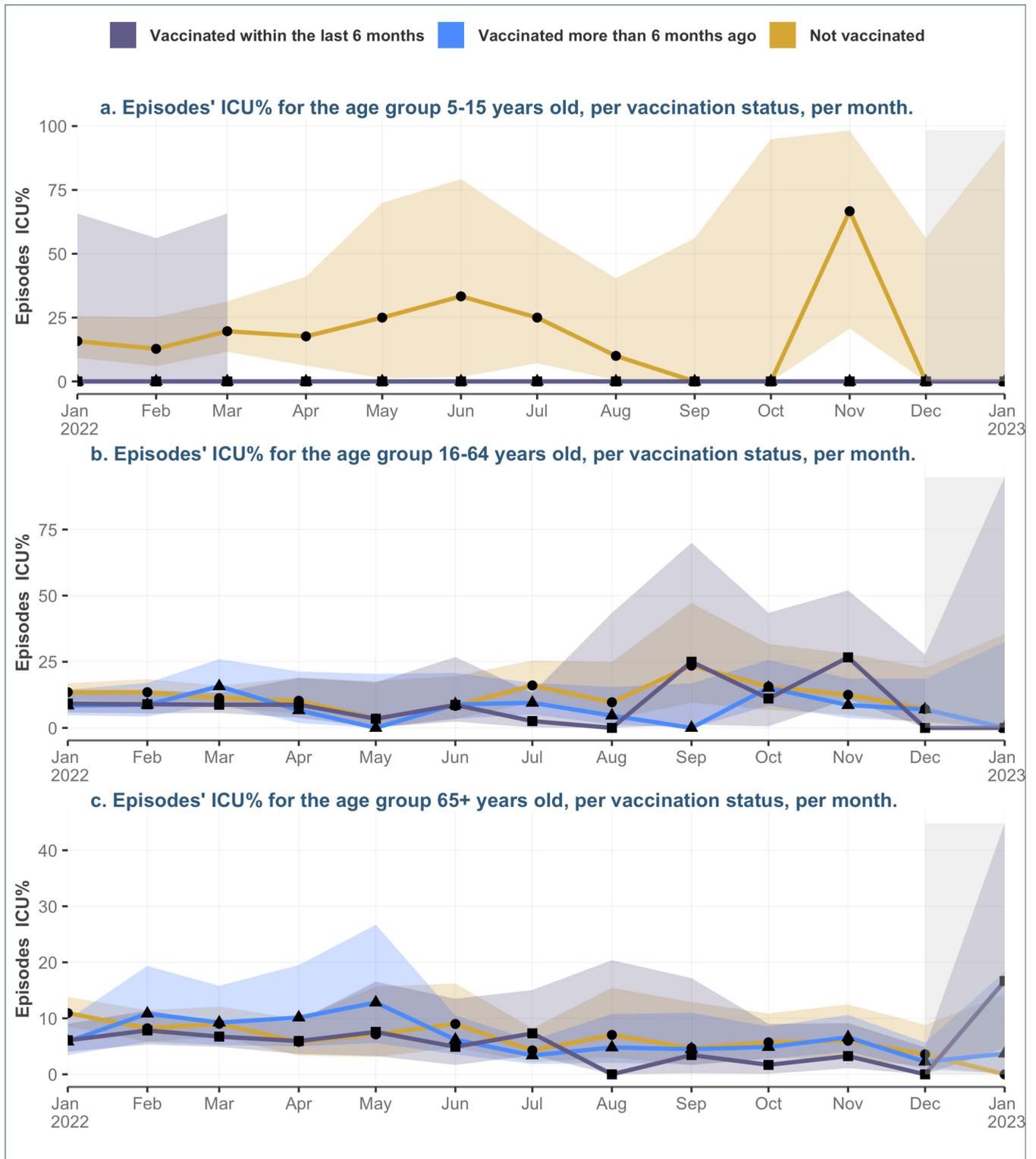


Figure 13: ICU admission rate (ICU%) by age and by vaccination status over time: percentage of episodes, which resulted in ICU admission of the patient in hospital. Records with incomplete data were not included. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. The coloured bands on this plot indicate the 95% confidence interval around the estimated ICU%. A gap in the coloured band means that the confidence interval goes beyond the displayed range of the plot.

5. Influenza

5.1. Influenza epidemic curves

The influenza's seasonal data collection within CH-SUR begins its collection each November. In the Figure 14, the current, developing influenza epidemic curve can be compared and contrasted with past seasons' epidemic curves. Essential demographic information for the ongoing influenza season is also displayed. Epidemic curves should be compared with caution, due to a varying number of hospitals which reported data over each specific season. For additional weekly updates about the current influenza season please refer to [Saisonale Grippe – Lagebericht Schweiz](#).

This data is not representative for whole Switzerland, but represents the situation in the CH-SUR Hospitals partners.

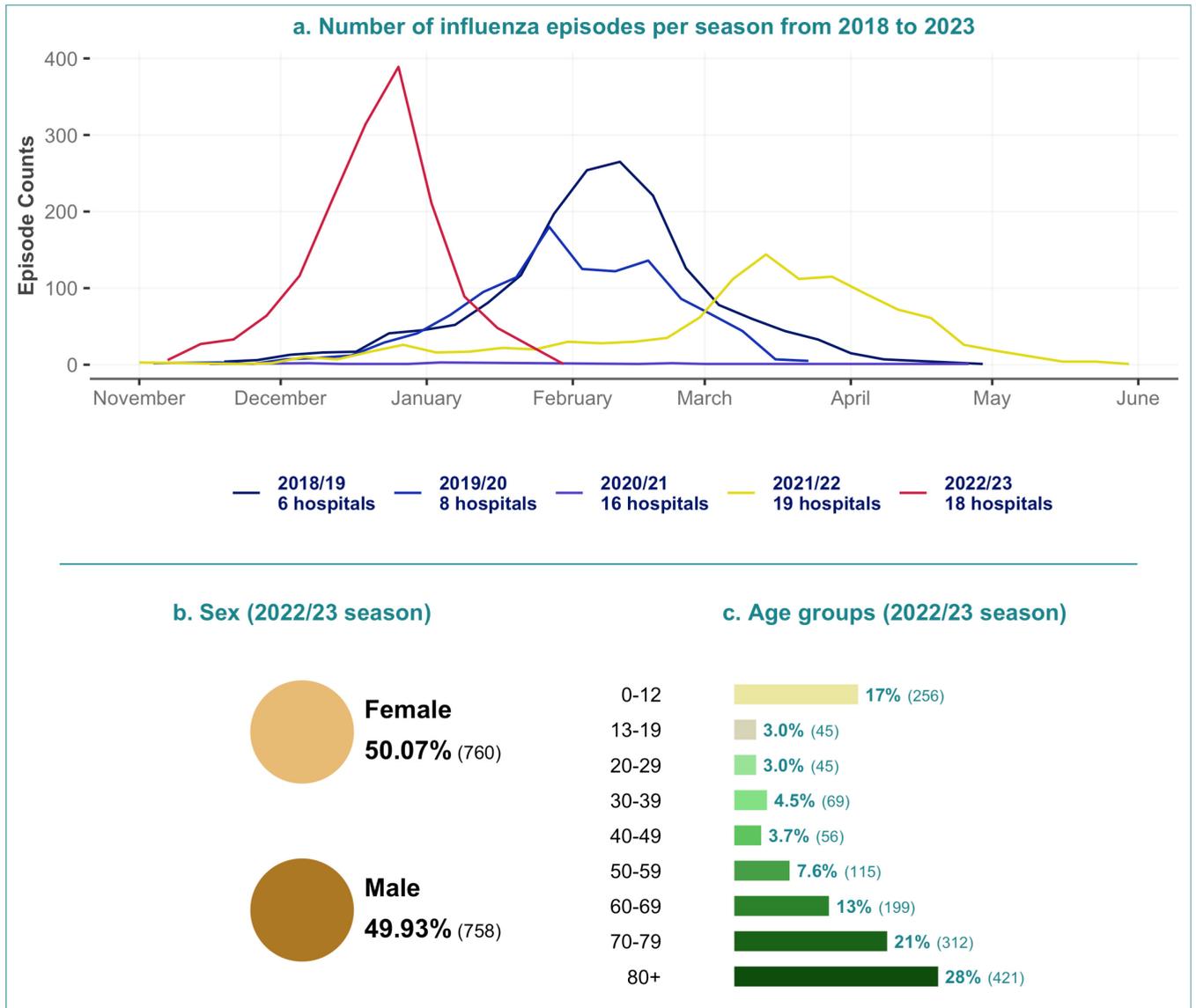


Figure 14: Number of episodes per influenza seasons, with the age and sex demographic characteristics of the ongoing season.

5.2. Summary of influenza episodes for season 2022-2023:

Important note: the epidemiological and clinical data for the ongoing influenza season are to be interpreted with caution, given the limited number of patients and events. Additional registrations are expected.

- We registered a total of 1479 influenza episodes including 190 (13%) nosocomial infections (16 unknowns) (Figure 15).
- Influenza type A virus was detected in 1428 (98%) episodes, and influenza type B virus in 31 (2%) episodes. Influenza type was unknown for 20 episodes.
- A total of 135 (9%) influenza episodes included a stay in intermediate care. Among those, 40 (30%) required non-invasive ventilation.
- A total of 138 (9%) episodes included a stay in intensive care. Among those, 54 (39%) required non-invasive ventilation, 41 (30%) required invasive ventilation and 4 (3%) required ECMO.
- A total of 22 influenza episodes resulted in death during hospitalisation.

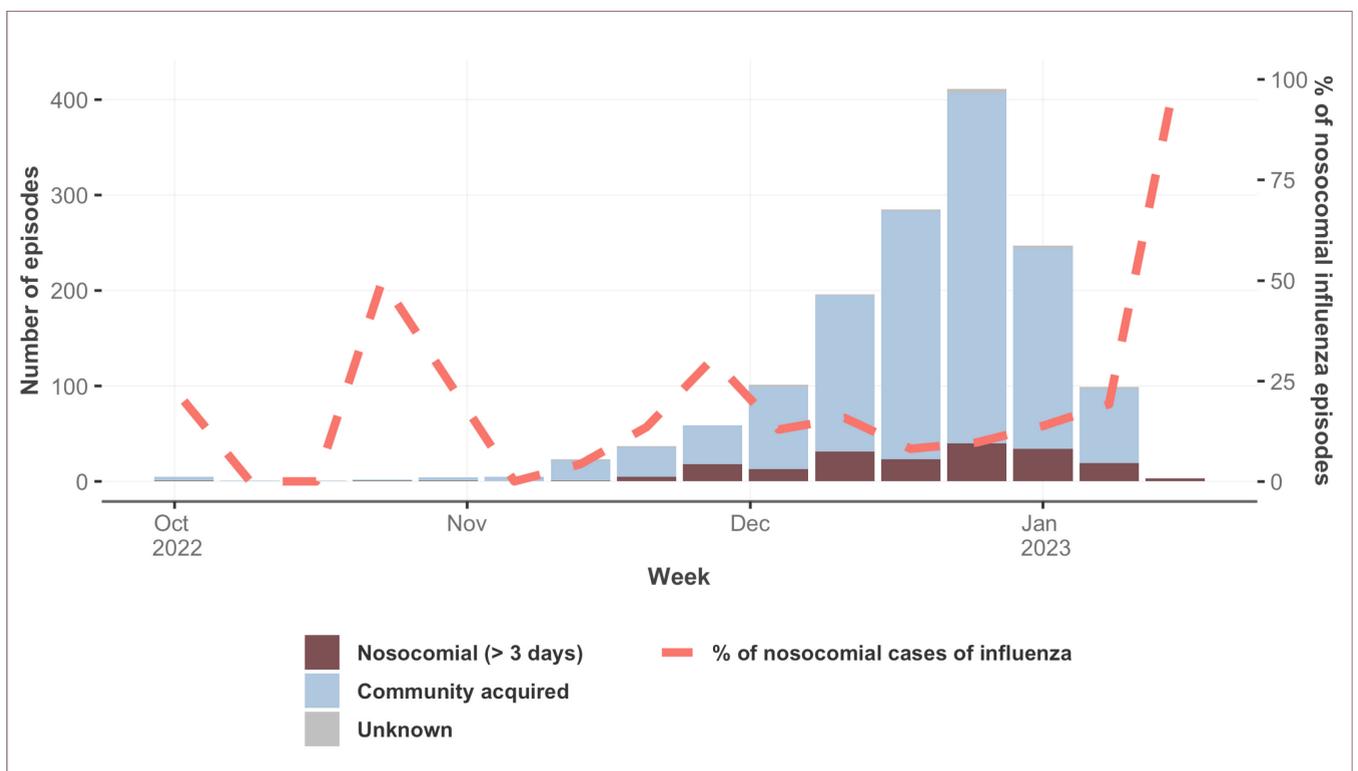


Figure 15: Origin of infection of influenza episodes per week.

6. Glossary and supplemental information

Inclusion criteria:

CH-SUR collects data of patients hospitalized with a documented SARS-CoV-2 infection and a duration of stay longer than 24 hours. Confirmation of infection is a positive PCR (polymerase chain reaction) test or a positive rapid antigen test, as well as a clinical finding for COVID-19. **Nosocomial** SARS-CoV-2 infections are also registered in the database and are described in a special section at the end of this report.

Hospitalization:

This is the shortest unit of analysis of the data and corresponds to the time between admission and discharge from any hospital participating in CH-SUR. This interval must be longer than 24 hours to be counted as an hospitalization. A new hospitalization is registered each time a person is admitted to hospital. Given the frequent re-admissions within one single course of the disease (one single infection), this report bases its analysis in the number of episodes and not in the number of hospitalizations.

Episode:

An episode number is given to each new admission to hospital, which is separated by at least 30 days from a prior hospitalization and lasts for more than 24 hours. Therefore, if a patient is hospitalized only once, or several times within 30 days, then both scenarios account for only one episode. Two different hospitalizations of the same patient that happen separated by 30 days result in two different episode numbers. If a patient is transferred between two hospitals participating in CH-SUR within the period of 30 days after last discharge, then these hospitalizations account for the same episode. One episode can therefore include multiple hospitalizations and each hospitalization can include multiple ICU admissions.

Testing strategy:

On April 1, 2022, Switzerland returned to the normal epidemiological situation. Since then, the testing of all patients at admission was replaced with more targeted strategies (see current **Swissnoso recommendations**). This change in testing strategy may have led to a reduction in the number of cases detected, narrowing the patients identified to mainly those with typical COVID-19 symptoms.

Reason for the hospitalization:

- *Hospitalization because of COVID-19:* on the basis on the information available at admission, the patient is hospitalized because the patient has symptoms due to COVID-19 or the patient suffers from a decompensation of a chronic disease, evidently caused by COVID-19.
- *Hospitalization with a SARS-CoV-2 infection:* on the basis on the information available at admission, the patient has a positive test for SARS-CoV2 but is hospitalized without COVID-19 symptoms for a problem other than COVID-19. In other words, the predominant problem is a non-COVID-19 disease or accident.

Origin of the infection:

- *Community acquired infection:* the SARS-CoV-2 infection was detected before the admission into the hospital or within the first 5 days after admission.
- *Nosocomial infection:* the episode is registered as “Nosocomial” if the SARS-CoV-2 is detected 5 days after admission into the hospital.

Severity score at admission:

For adults, the severity score used is the CURB-65 score. One point is given for each of the following symptoms: confusion (abbreviated Mental Test Score < 9), blood urea nitrogen > 19 mg/dL, respiratory rate > 30 per minute, low blood pressure (diastolic < 60 or systolic < 90 mmHg), age > 65 years. For children, one point is given for each of the following: respiratory distress, oxygen saturation < 92%, evidence of severe clinical dehydration or clinical shock and an altered consciousness level. The severity score corresponds to the sum of the given points.

Intermediate care unit (intermediate care or IMC): care unit caring for patients who have a failure of a vital function or whose burden of care does not allow a return to a hospitalization unit. These units are the link between an intensive care unit and a beds service.

Intensive care unit (ICU): care unit caring for patients who have a serious failure of one or more vital functions or who are at risk of developing severe complications.

Vaccination status:

The vaccination status definition is based on the most recent dose of vaccine received, if the patient received any. The vaccination status is composed of the following categories:

- a) *Vaccinated within the last 6 months:* Patients who received their last vaccination dose within 6 months before the time of the positive SARS-CoV-2 test.
- b) *Vaccinated more than 6 months ago:* Patients who received their last vaccination dose more than 6 months before the time of the positive SARS-CoV-2 test.
- c) *Vaccinated (unknown date):* Patients who received at least one dose of the vaccines **approved by WHO** before the positive test but with no information about when the last dose was administered.
- d) *Not vaccinated:* Patients who had not received a single dose of any vaccine **approved by WHO** by the time of the positive SARS-CoV-2 test.
- e) *Unknown status:* Patients for whom vaccination information was not available.

Important notes: Special populations Children under 5 are not included in any age-specific analysis of the vaccination status, as they are not recommended to receive any vaccination dose.

Discharge: When the patient leaves the hospital alive, the departure is qualified as “discharge” if the patient goes to:

1. his/her domicile
2. a long-term care facility
3. another hospital
4. another institution not participating in the CH-SUR surveillance
5. a rehabilitation establishment
6. destination unknown

Reason of death: Patients for whom COVID-19 was the cause of death (died of COVID-19) are shown separately from COVID-19 patients who died of other causes (died with COVID-19, but not of COVID-19). A medical doctor at the hospital for each CH-SUR-participating center determined of whether a patient died of COVID-19 or another cause. Cases where the cause of death is not certain, but there was a COVID-19 diagnosis (in conformity with inclusion criteria for CH-SUR) are counted as died of COVID-19 or suspected death of COVID-19.

Dealing with missing data: When mentioned in the text, missing data are excluded from the analysis. Otherwise, records with missing data are included in the total numbers and analyzed accordingly. This may lead to the situation where the denominators of different categories analyzed do not sum up to the same total. Where indicated, Data from the last two months are considered provisional due to entry delays and are highlighted in gray in certain figures.

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